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ABSTRACT

While the idea of reusing objects in digital learning environments is not new, continual strides are being made toward improving the prospects of reusability. A major trend in company training settings is to think of reusability in terms of a LMS (learning management system), but instructor use and pedagogies are little considered. This paper describes an approach to re-use learning objects based on a pedagogical model that puts learner interaction and contribution in the driving role and which sees LMSs and LCMSs (learning content management systems) as tools for the instructor or learner. (Contains 10 references and 3 figures.) (Author/AEF)

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New Pedagogies and Re-Usable Learning Objects: Toward a Different Role for an LMS

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Abstract While the idea of reusing objects in digital learning environments is not new, continual strides are being made toward improving the prospects of reusability. A major trend in company training settings is to think of reusability in terms of a LMS (learning management systems), but where instructor use and pedagogies are little considered. We describe an approach to re-use based on a pedagogical model that puts learner interaction and contribution in the driving role and which sees LMSs and LCMSs as tools for the instructor or learner.

LMSs, LCMSs: Where is the Instructor?

There is currently much attention in the business world to the re-use of learning objects. Frequently this occurs in the context of the introduction of "e-learning" where the latter runs separately from "classroom courses". E-learning is typically seen as being instructor-free or -neutral, in order to capitalize on an "any time, anywhere" motivation. Complex systems, called learning management systems (LMSs) and learning content management systems (LCMSs), are proliferating, generally based on the underlying assumption that the system itself will select and deliver the learning experience, based on some level of sophisicated user modelling. LMSs are defined as systems "to manage learners, keeping track of their progress and performance across all types of learning activities" while LCMSs manage content or learning objects to "serve up to the right learner at the right time" (Chapman & Hall, 2001, p. 11). LCMSs typically include content-development tools, being in effect a new iteration of the long series of attempts to bring authoring tools into mainstream use for computer-supported learning. "Content assembly" and "publish learning" into different "output formats" are key tasks of LCMSs (Chapman & Hall, p. 16).

Meanwhile at the same time as commercial LCMSs and LMSs are being taken up for "e-learning" in company training settings, the use of Web-based course-management systems, also called online educational delivery systems (Landon, http://www.c2t2.ca/landonline/), continues to grow in importance particularly in support of instructor-led courses with or without a classroom component. Course-management systems (CMSs, not to be confused with content-management systems, also sometimes called CMSs) integrate content delivery, communication, learner activities, collaborative work support, feedback, testing, portfolio development, groupware tools, and administrative tools for the instructor. Selection of content objects is only part of the use of an online educational delivery system, and in many cases a minor part.

The relationship of LMSs and LMCSs to instructor-led classroom or blended learning is not yet much studied. Partially this is because the use of LMSs and LCMSs is still new, and most companies making these major purchases are still in the phasing-in stages. More fundamentally, it is because those responsible for LMS and LMCS use in the organization tend to operate separate from the "business as usual" instructor-led courses which are typically the candidates for extension via an online delivery system. The fundamental issue is: Where is the heart of the learning process? In the delivery of pre-made learning objects or in the support of learning activities involving human interaction and problem solving in workplace contexts making use of in-house experience? We believe that in a company learning context the emphasis should be on the latter (Collis, 2001; Collis & Winnips, 2001). When we start with a pedagogy based on the solving of real workplace problems ("authentic learning", Harrington, Reeves, & Oliver, 2001) where the interaction with others is critical we

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come to a different view on reusability, and the technologies that support it. This relationship is part of a research project involving the Faculty of Educational Science and Technology at the University of Twente and the Shell Learning Centre. This paper will discuss some aspects of the on-going work.

Pedagogical Base: Focus on Contribution Intended for Reuse

What is a pedagogical aim that is highly related to re-use? We offer the proposition that it is not an aim primarily related to finding "instructional" content from elsewhere, but rather one with a strong orientation toward learning from experiences, from one's own and from those of others. This involves a pedagogical shift, away from an emphasis on learning as acquisition of predetermined content, toward a balance that includes or even emphasizes learning as participating and contributing to the learning experience in a way which can be captured and reused by others (Collis & Moonen, 2001; Collis & Strijker, 2002; Sfard, 1998). The basis of this pedagogy is educational (see also for example, Kearsley & Shneiderman, 1998) but it also is based on strategic and practical considerations. By an approach in which participants themselves contribute resources in a way that is intended for use by others during the course itself and in subsequent cycles of the course, a large collection of locally relevant resources is accumulated on an on-going basis based predominately on the work of the participants and thus less on the preliminary work of instructor or learning-object designer. This involves shifting of the costs in terms of preparation time, from the content producer or instructor to the participants (Collis & Moonen, 2001). The resources accumulated fit with the style and level of the local participants (avoiding the "not invented here" problem), and in the company setting particularly, the tacit knowledge of the participants is made available to others in the institution (Collis & Winnips, 2001). An important point in this pedagogy is that many of the reusable resources are not to be seen as professionally made self-contained study materials; their creation, use, and reuse comes from the way the instructor or learner sees them as helpful for learning activities based on actual workplace problems.

The reuse of submitted contributions however is not automatic simply because the contributions are available to all in the course environment. Their reuse comes primarily from the pedagogy used by the instructor. As an example, participants can be asked to study one or more of the contributions of others in the current course or previous courses if available for reuse, and as the next activity compare and contrast their own workplace situations with those of their peers. Many such guided activities have been in use at the University of Twente for several years (De Boer & Collis, 2001); in the company context the pedagogical experience is only at the starting point.

For the products of such activities to be reusable as digital resources in other learning settings, the underlying database and system technology as well as the user interface must meet several requirements.

Technology Requirements

The technology required for support of this pedagogy requires an underlying object-oriented database. We suggest that gradually, an *experience management* architecture (Layton, 1999) will need to integrate the now-familiar course management systems with systems such as LMSs and LCMS as well as others. Figure 1 shows the architecture that we are currently researching.

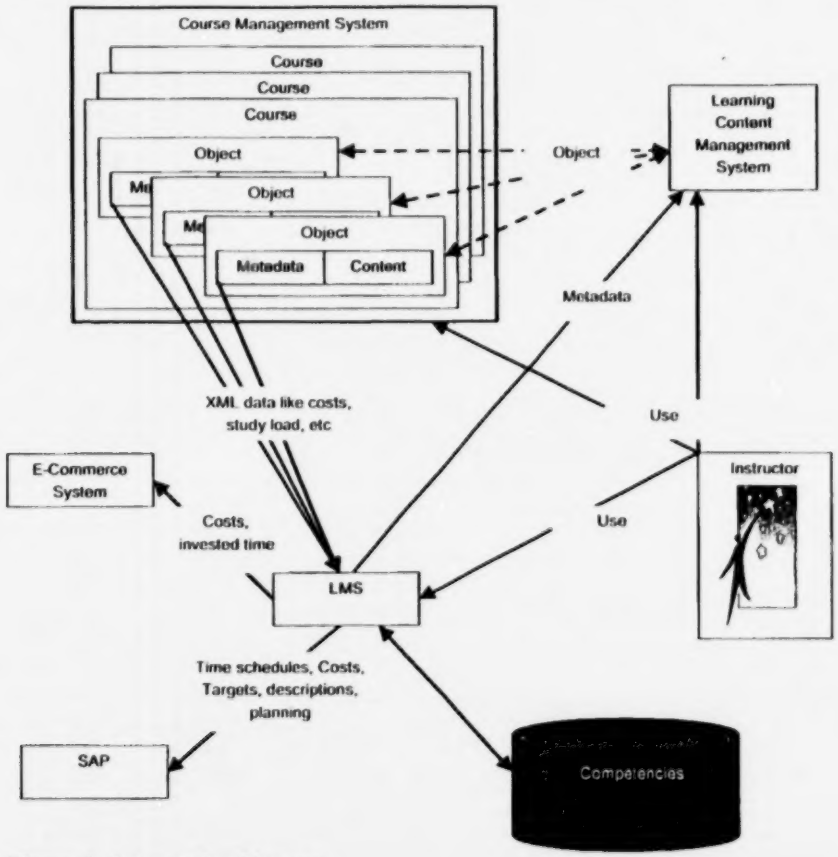

Figure 1. Integrated architecture

For contribution-based reusability to grow in an institution, specific technical tools and user interface functionalities are critical. First, there must be a simple way for participants (instructors and learners) to enter new resources into a common database. Figure 2 shows one of the templates we make directly available in the course environments running under our local *TeleTOP* course-management system.

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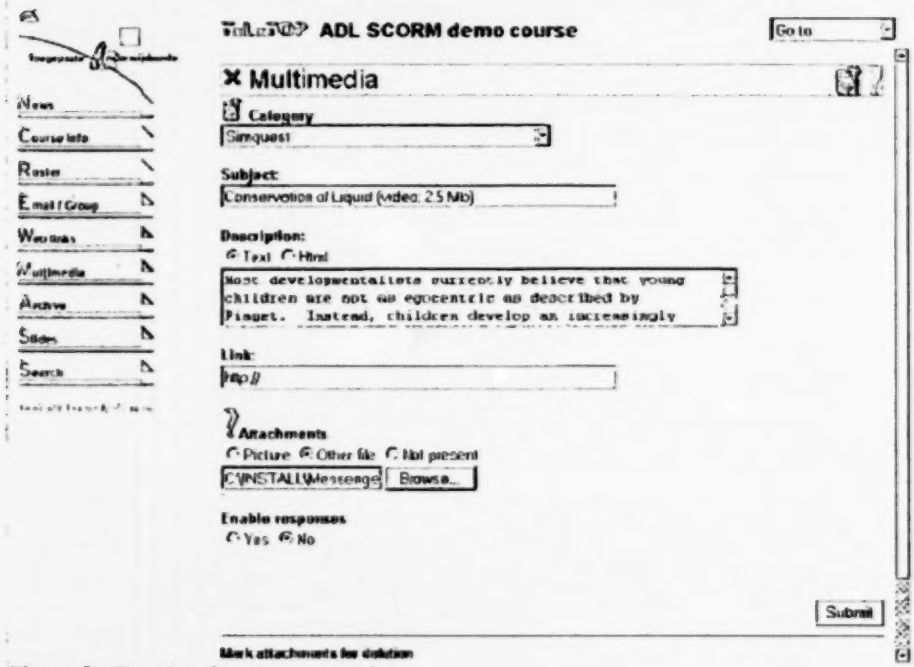

Figure 2. Template for resource creation

At the moment that an object is thus submitted into the database, metadata based on SCORM standards can be automatically assigned for some of the SCORM fields. A new document containing a metadata record is created automatically for each submitted item and stored in a metadata database.

In the TeleTOP system, the submitted items can be directly made available to all course participants for re-use in subsequent learning activities. The instructor decides this, and can decide that all participants have direct read and write rights at one extreme, or at another, that only an object chosen by the instructor is re-used in a read-only format at the other extreme.

For the submitted objects to be reused outside of the immediate course context as well as within it, the instructor needs to make a selection of which materials are good candidates for reuse. For these selected objects, the instructor can then add a broader range of metadata to help in the later retrieval process. Figure 3 shows the combination of automatically affixed metadata and the possibilities for local entries.

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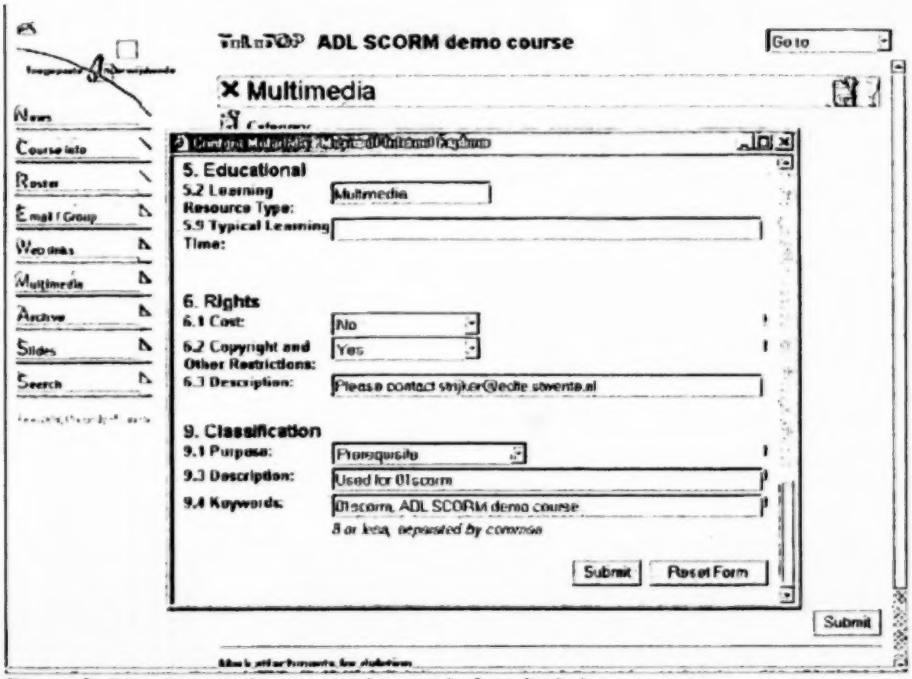

Figure 3. Metadata supplement template, ready for submission

Note that it is not every item submitted during the course which requires this localizing attention; only the relatively select and small sample that the instructor sees as good candidates for reuse. There is automatic XML representation of metadata documents generated within the TeleTOP system.

Subsequent searches of the objects in the database to look for candidates for reuse are made via the metadata document forms, which are in turn related to the actual submitted objects and can faciliate their being copied into the next desired environment. A simple interface is available to support the search process using any keywords on the metadata documents, and to facilitate the copying process, to move the items selected for reuse into a new course environment. In the instructor-led course, it is the instructor, not a LCMS or LMS, that makes these decisions. The LCMS can help the instructor be aware of resources that are available and the LMS can help the instructor be better attuned to the learning histories of the participants. But, in this sort of contribution approach, it is the instructor (or course manager or facilitator or even the learner) who decides what learning objects are most helpful for the problem-based activities that form the heart of the course.

Through the combination of these sorts of technologies and pedagogies, and in the implementation context of a course as a activity and contribution-oriented setting, a number of the barriers limiting the potential reuse of digital resources can be addressed, particularly those that relate to fit with the local context. In a (multinational) company training setting, the reuse aspect also brings a gradual increase in the sharing of in-house knowledge and experience (Collis & Winnips, 2001).

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